Multiturn absolute encoder

ESM58-PN

Technical Data

General specifications
- Detection type: photoelectric sampling
- Device type: Multiturn absolute encoder
- UL File Number: E223176 "For use in NFPA 79 Applications only", if UL marking is marked on the product.

Functional safety related parameters
- MTTFd: 120 a
- Mission Time (TM): 20 a
- L10: 1.9 E+11 at 6000 rpm and 20/40 N axial/radial shaft load
- Diagnostic Coverage (DC): 0 %

Electrical specifications
- Operating voltage (U0): 10 ... 30 V DC
- Power consumption (P0): max. 4 W
- Linearity: ± 0.5 LSB (12 Bit)
- Output code: binary code
- Code course (counting direction): programmable, cw ascending (clockwise rotation, code course ascending) cw descending (clockwise rotation, code course descending)

Interface
- Interface type: PROFINET IO
- Resolution:
  - Single turn up to 16 Bit
  - Multiturn: 14 Bit
  - Overall resolution up to 30 Bit
- Physical:
  - Ethernet
  - Transfer rate: ≤ 1 ms (IRT) ; ≤ 10 ms (RT)

Connection
- Connector:
  - Ethernet: 2 sockets M12 x 1, 4-pin, D-coded
  - Supply: 1 plug M12 x 1, 4-pin, A-coded
- Standard conformity:
  - Degree of protection: DIN EN 60529,
    - housing side: IP64 (without shaft seal)/IP66 (with shaft seal)
    - shaft side: IP65
  - Shaft seal: Stainless steel version (INOX): completely IP67
- Cyclic testing: DIN EN 60068-2-3, no moisture condensation
- EMI:
  - EN 61000-6-4:2007
  - Noise immunity: EN 61000-6-2:2005
- Shock resistance: DIN EN 60068-2-27; 100 g, 6 ms
- Vibration resistance: DIN EN 60068-2-6, 10 g, 10 ... 2000 Hz

Ambient conditions
- Operating temperature: -40 ... 85 °C (-40 ... 185 °F)
- Storage temperature: -40 ... 85 °C (-40 ... 185 °F)

Mechanical specifications
- Material:
  - housing: powder coated aluminum flange: aluminum shaft: stainless steel
  - Combination 1:
    - housing: powder coated aluminum flange: aluminum shaft: stainless steel
  - Combination 2 (Inox):
    - housing: stainless steel 1.4305 / AISI 303 flange: stainless steel 1.4301 / AISI 304 shaft: stainless steel 1.4305 / AISI 303
- Mass:
  - approx. 360 g (combination 1)
  - approx. 910 g (combination 2)
- Rotational speed: max. 12000 min⁻¹
- Moment of inertia: 30 gcm²
- Starting torque: ≤ 3 Ncm (version without shaft seal)
- Tightening torque, fastening screws: max. 1.8 Nm

Shaft load
- Angle offset: ± 0.9 °
- Axial offset: static: ± 0.3 mm, dynamic: ± 0.1 mm
- Radial offset: static: ± 0.5 mm, dynamic: ± 0.2 mm

Approvals and certificates
- UL approval: cULus Listed, General Purpose, Class 2 Power Source , if UL marking is marked on the product.

Model Number
ESM58-PN

Features
- Industrial standard housing Ø58 mm
- PROFINET IRT
- 30 Bit multiturn
- Recessed hollow shaft
- Network loop through by means of integrated 2 port switch (IRT capable)
- IP address resettable
- No DIP switches for address setting
- Mechanical compatibility with all major encoders with fieldbus interface
- Status LEDs

Description
In addition to the CANopen-, DeviceNet-, PROFINET-, AS-Interface encoders, we have broadened our product line of bus-capable absolute encoders with the ESM58 for Ethernet. Absolute multiturn rotary encoders deliver an absolute step value for each angle setting. This device has a maximum basic resolution of 65536 steps per revolution (16 bits) and codes up to 16384 revolutions (14 bits). Thus the overall resolution amounts to 30 bits. On account of the high number of measuring steps resulting (more than 1 billion), this type of encoder can be used to divide very long linear distances into small measuring steps. The Ethernet interface of this absolute encoder supports the Profinet protocol. The integrated webserver provides Java applets, which allow the whole parameterisation of the encoder via any web browser. In addition to various functions like resolution adjustment, e-mail-servicing, change of the IP address and many others, the following operation modes can be selected:
- Polled Mode
- Cyclic Mode
- Change of State Mode
The device is mounted directly onto the application shaft, without any coupling. Rotation of the absolute encoder is prevented by a torque rest.
Multiturn absolute encoder ESM58-PN

Dimensions

max. insertion depth = 30
min. insertion depth = 15

L: Singleturn = 87
Multiturn = 98

Dimensions:

- Max. insertion depth: 30
- Min. insertion depth: 15
- Lay-on edge torque rest: 20°
- Ø63: 72
- Ø58: 75.9
- Ø59: 40
- L: Singleturn = 87
  Multiturn = 98

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Refer to "General Notes Relating to Pepperl+Fuchs Product Information".
### Electrical connection

<table>
<thead>
<tr>
<th>Pin</th>
<th>Male connector M12 x 1, 4-pin, A-coded</th>
<th>Female connector M12 x 1, 4-pin, D-coded</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supply voltage +U_B</td>
<td>Tx +</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>Rx +</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>Tx -</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>Rx -</td>
</tr>
</tbody>
</table>

#### Indicators

**Diagnostic LEDs**

<table>
<thead>
<tr>
<th>LED</th>
<th>Color</th>
<th>Description for LED = ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active1</td>
<td>Yellow</td>
<td>Incoming and outgoing data traffic for port 1</td>
</tr>
<tr>
<td>Link1*</td>
<td>Green</td>
<td>Connection to other Ethernet devices on port 1</td>
</tr>
<tr>
<td>Active2</td>
<td>Yellow</td>
<td>Incoming and outgoing data traffic for port 2</td>
</tr>
<tr>
<td>Link2*</td>
<td>Green</td>
<td>Connection to other Ethernet devices on port 2</td>
</tr>
<tr>
<td>Stat1</td>
<td>Green</td>
<td>Status 1, details see table below</td>
</tr>
<tr>
<td>Stat2</td>
<td>Red</td>
<td>Status 2, details see table below</td>
</tr>
</tbody>
</table>

* flashes with 2 Hz if engineering identification call is activated and link connection is available

**Stat1 (green)**

<table>
<thead>
<tr>
<th>Stat2 (red)</th>
<th>Meaning</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>bus failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>off</td>
<td>off</td>
<td>No power</td>
</tr>
<tr>
<td>on</td>
<td>on</td>
<td>No connection to another device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Criteria: no data exchange</td>
</tr>
<tr>
<td>on</td>
<td>flashes 1)</td>
<td>Parameterization fault, no data exchange</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Criteria: data exchange correct.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>However, the slave did not switch to the data exchange mode.</td>
</tr>
<tr>
<td>on</td>
<td>off</td>
<td>Data exchange.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slave and operation ok.</td>
</tr>
</tbody>
</table>

1) flashing frequency 0.5 Hz for at least 3 seconds
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Order code

<table>
<thead>
<tr>
<th>E</th>
<th>S</th>
<th>M</th>
<th>5</th>
<th>8</th>
<th>-</th>
<th>P</th>
<th>N</th>
<th>R</th>
<th>0</th>
<th>B</th>
<th>N</th>
<th>-</th>
</tr>
</thead>
</table>

Number of bits singleturn
13 8192 (standard)
16 65536

Number of bits multiturn
12 4096 (standard)
14 16384

Temp.
N normal

Output code
B binary

Option
0 none

Exit position
R radial

Connection type / protocol
PN Profinet protocol, 1 female connector/1 male connector, M12 x 1

Shaft dimensions
F1A Recessed hollow shaft Ø10 mm x 30 mm
F2A Recessed hollow shaft Ø12 mm x 30 mm
F3A Recessed hollow shaft Ø15 mm x 30 mm

Housing material
N Aluminium, powder coated
W Aluminium, powder coated with shaft seal
I Stainless steel

Function principle
M Multiturn

Shaft version
S Recessed hollow shaft

Data format
E Ethernet

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".